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(54) Title of the Invention: Bactericidal and fungicidal agent

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## SPECIFICATION

### 1 Title of the Invention

Bactericidal and fungicidal agent

### 2 Scope of the Patent Claims

1 A bactericidal and fungicidal agent that contains, as an active component, a mixture of yucca sap and an acid.

2 The bactericidal and fungicidal agent described in claim 1, wherein the acid is an organic acid that is harmless to the human body.

3 The bactericidal and fungicidal agent described in claim 1 and claim 2, wherein the acid is acetic acid.

### 3 Detailed Description of the Invention

#### [Field of Industrial Utilization]

The present invention relates to a bactericidal and fungicidal agent, and more particularly relates to a bactericidal and fungicidal agent harmless to the human body that is able to suppress the growth of fungi and bacteria and, accordingly, that is able to suppress the generation of unpleasant odors.

#### [Prior Art]

By way of example, when an individual sweats, the ureas and living and dead matter within the dead cells and so on contained in the sweat residually affix to the underwear and socks and so on worn by the individual as well as to the skin of the individual and, as a result of the action of bacteria present naturally in air, some of this material decomposes

easily in a short period of just a few minutes leading to accelerated growth of new bacteria and fungi. For this reason, unpleasant odors, including the smell of ammonia which is offensive to those in the immediate proximity thereof, are released and, moreover, the growth of new bacteria and fungi may lead to blockages of the skin and results in, by way of example, the development of athlete's foot, ringworm, nappy rash or other inflammations.

A known example of a bactericidal and fungicidal agent hitherto used for suppressing the growth of fungi and bacteria and the like is a tributyltin oxide-based pharmaceutical that was actively employed for the prevention of sock and underwear odor up until the late fifties and early sixties at which time its use was banned because it was discovered that this pharmaceutical, which is an organic compound containing heavy metals able to permeate the skin, has a deleterious effect on the human body when it comes into direct contact therewith. Although several bactericidal and fungicidal agents that use a variety of pharmaceuticals of which salicylic acid is the base material that are harmless to the human body and, moreover, that are able to suppress the growth of bacteria have been proposed, a bactericidal and fungicidal agent deemed to be completely satisfactory in all respects has still yet to be discovered.

[Problems to be Solved and Means for Resolving said]

With the foregoing in view, and as a result of the implementation of a range of investigations by the inventor of the present invention aimed at producing a bactericidal and

fungicidal agent harmless to the human body which suppresses, in particular, the growth of bacteria that has its origin in the matter produced by sweat and which, as a result, is not only able to prevent the generation of unpleasant odors but also prevents the occurrence of inflammations of the skin and so on, it was discovered that the object of the present invention could be achieved by the adoption of, as the active component, a mixture of a specific component and an acid, and this led to the completion of the present invention.

[Gist of the Invention]

That is to say, the gist of the present invention lies in the provision of a bactericidal and fungicidal agent that contains, as its active component, a mixture of yucca sap and an acid.

[Constitution of the Invention]

Although the bactericidal and fungicidal agent of the present invention constitutes a mixture of yucca sap and an acid, the yucca sap is normally used in a diluted form of 5 to 20 times or 100 to 50,000 times in accordance with the usage objective. Although the characterizing feature of the resin itself lies in the fact that it has been discovered to possess a growth-suppressing effect and a buffering action on fungi and bacteria, it produces little growth suppressing effect in very low concentrations and there is little significant alteration of the effect thereof in very strong concentrations.

On the other hand, examples of the type of acid employed, of which there are no particular restrictions thereto

provided it is harmless to the human body, include organic acids such as acetic acid, propionic acid, succinic acid, citric acid, nitric acid and tartaric acid, and organic acids such as sulfuric acid and, of these, acetic acid is particularly preferred. These acids are known to possess a sterilizing effect and they exhibit an even better sterilizing effect when used in combination with yucca sap as is the case in the present invention.

The acid concentration is normally of the order of 3 to 10% and, in concentrations that are too low, not only is the sterilizing effect produced by the acid unsatisfactory, no resultant synergistic action in its combined use with yucca sap occurs and, conversely, acid concentrations that are too high are unsuitable for use on the human body. In addition, the ratio of acid to yucca sap can be selected in accordance with the usage objective.

Although the bactericidal and fungicidal agent of the present invention can be constituted using an aqueous medium as the base material, in accordance with normal methods it can also be used with, by way of example, alcohol-based mediums, creamy state mediums or aqueous gel mediums as the base material. In addition, the use of various other additives and, furthermore, other active components besides the active component of the present invention is possible.

#### [Effect of the Invention]

The growth of fungi and bacteria that has its origin in, in particular, the ureas and dead cells produced when an

individual sweats can be satisfactorily suppressed by the bactericidal and fungicidal agent of the present invention described above. Accordingly, not only can unpleasant odors caused by the growth of fungi and bacteria be suppressed, skin inflammations and the like can also be prevented. Furthermore, by virtue of the fact that, because the bactericidal and fungicidal agent of the present invention is harmless to the human body and it can be smeared directly on the skin and, moreover, it can be impregnated into underwear and socks and the like in advance, the field of utilization of the present invention is very broad.

[Working Examples]

Although a more detailed description of the present invention is given below based on working examples thereof, the present invention should not be regarded as restricted to these working examples and other examples thereof, provided they are not beyond the gist of the invention, are possible.

Working Examples

In order to examine the growth suppressing action of the bactericidal and fungicidal agent of the present invention on bacteria, the diameter of the inhibited zone of bacteria that decomposes proteins, carbohydrates and fats and the like was measured on an agar culture.

### 1. Test cultures

The test cultures were formed by the mixing of the abovementioned bacteria into saccharose-infused potato agar cultures and then the dispensing of 15ml of each into Petri dishes of diameter 9cm and curing of said.

### 2 Test paper

The test papers were produced by the immersion of a 5.5mm diameter (Toyo Filter Paper No. 131) for 10 minutes in yucca sap, acetic acid and a liquid mixture of these two components which were then placed on a dry filter paper to remove the excess test liquid thereof.

### 3. Testing Method

Each of the test papers processed using the same test liquid were arranged at approximately 3cm intervals on the testing agar cultures which were then covered and left to cultivate at 30°C for 12 hours, whereupon the diameter of the inhibited zones thereof was measured and the average diameter for each Petri dish obtained and compared for each test liquid. This was implemented twice using the same method, the results of which are shown in Table 1.

It should be noted that the size of the inhibited zone differs depending on the type of bacteria used, because a mixed fungus was employed, for each group of Petri dishes the measurement of the diameter of the smallest inhibited zone (the bacteria most resistant to the reagent) was taken.

Table 1

30°C 12 hours cultivation

| Working<br>Example<br>No. | Concentration of test<br>paper reagent |                    | Inhibited<br>zone diameter<br>(mm) |
|---------------------------|--|--------------------|------------------------------------|
|                           | Yucca sap<br>(%)                       | Acetic acid<br>(%) |                                    |
| 1                         | 10                                     | 0                  | 6.8                                |
| 2                         | 5                                      | 0                  | 5.5                                |
| 3                         | 10                                     | 10                 | 24.5                               |
| 4                         | 10                                     | 5                  | 22.0                               |
| 5                         | 10                                     | 1                  | 10.0                               |
| 6                         | 0                                      | 6                  | 16.6                               |
| 7                         | 0                                      | 0                  | 5.5                                |

Here, (1) the diameter of the test paper (5.5mm) is included in the inhibited zone diameter.

(2) 0.00102ml of reagent is contained in each test paper.

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